

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of) **RM-11306**
Amendment of Part 97 of the Commission's)
Rules To Implement the Basis for Bandwidth)
Based Bandplanning)

Via the ECFS

Comments of The **Society for the Preservation of Amateur Radio** on RM-11306

I. Introduction

1. The Society for the Preservation of Amateur Radio (SPAR) is a non-partisan group of concerned amateur radio operators working together to ensure the vitality of the Amateur Radio Service as defined in the US Legal Code 47 CFR Part 97, especially the purposes embodied in 97.1. It is our belief that the technical nature of the Amateur Radio Service is clearly acknowledged in the US by the FCC, particularly in Part 97.1, items (b), (c) and (d), which comprise 3 of the 5 reasons for the establishment of the Service.
2. We acknowledge the proud history of technical and non-technical contributions that amateur radio operators have made to radio communications technology and strive to ensure the Amateur Radio Service preserves traditional operating modes and remains able to continue to meet the technical challenges of the future.
3. We believe failure to require adequate entry-level skills will lead to chaos on the amateur bands, which are an internationally shared resource, and that inadequate enforcement of the regulations governing amateur radio will render the service useless and drive away those persons who could most contribute to the "advancement of the radio art."
4. We believe it essential for the survival of the Amateur Radio Service that continuous advancement in "skills in both the communications and technical phase of the [radio] art" be encouraged.

5. We believe the Amateur Radio Service should be open to all interested persons. Due to the inherently technical nature of amateur radio communications, it is important to ensure that amateur radio operators possess at least minimum skills and that the regulations concerning the Amateur Radio Service must encourage the further development of "trained operators, technicians, and electronics experts."

6. We further believe that, due to the inherent nature of amateur radio, technical skills contribute directly to the "value of the amateur service to the public" and the "amateur's unique ability to enhance international goodwill."

II. Discussion

7. It is our belief that in the matter of Amateur Radio band planning, certain basic principles must be followed in order to ensure the resultant plan serves the greater good of all licensees. To this end, the bandplanning process must include the elements of Fairness, Flexibility, Inclusiveness, Effectiveness, be Realistic, and Forward Looking. The plan must also follow the basic guidelines of Part 97 for content allowed, methods employed, and be non competitive with commercial interests.

8. Fairness in a bandplan must account for the allocation of spectrum in a fair manner based on need, use patterns, and future growth. The plan must be Flexible to allow change as use patterns or other conditions change. This flexibility must allow changes to occur without undue delay and without being reactionary or capricious.

9. Any band plan must be Inclusive of all current licensees by taking no action that would orphan any current interest or mode based solely on the desire for change, especially if the orphaned modes are still actively used and practiced in the Amateur Radio Service.

10. Any new rules concerning bandplanning must be Effective in solving current problems or shortcomings in spectrum allocation rules. This is not an invitation for change for the sake of change itself. There must be a solid reason for a proposed change in spectrum allocation and the proposed action must effectively identify the issue and spotlight the needed change.

11. Any change in Amateur Radio spectrum allocation must be Forward Looking in that the change must allow and support growth of new modes and technology. Incumbent in this desire is the need to look forward to new digital technologies without being sidetracked by trying to implement old and inefficient digital methods not easily supported by the fair use of spectral

efficiency principles. This means that any proposed spectrum allocation or use change must be Realistic. Being realistic accepts that Amateur spectrum is limited and that the implementation of some wide band technologies may not be in the interest of all Amateurs whether by poor spectral efficiency, or by attempting to curtail use of more popular modes to gain spectrum.

12. Finally, any proposed change must purport well with the purpose of the Amateur Service and follow the basic guidelines which require openness while eschewing obscenity, pecuniary interests, and competition with commercial services. Rules concerning third party traffic must be adhered to as well.

III Precursory Action Needed by the Commission

13. The Members of SPAR believe that before the Commission can act on any proposed change in spectrum allocation that would encourage digital use, it must define the bounds of generally acceptable digital application more clearly. Encouraging more digital use without clarifying existing rules is an invitation to failure in our opinion as it may encourage use that will ultimately be found to be illegal.

14. Examples of questions that must be answered before acting on any bandplanning/spectrum allocation petitions are (but not limited to): In the digital world of emails and file transfer, what constitutes violation of encryption rules? What limits or safeguards must be placed on content to prevent violation of third party rules, and use by non-amateurs? What guidelines must Amateurs follow in seeking to interface with the Internet for obscenity rules, and rules on pecuniary interests? What constitutes digital services which are in competition with commercial services and therefore not allowed under current rules?

15. The Commission must also address rules concerning automatic and semi-automatic stations and set clear guidelines as to what is acceptable in interference mitigation. Likewise, the Commission must consider the interference implications of mode mixing on Amateur HF frequencies where there will soon be more participants by virtue of NPRM 05-235, and must also consider the possibility that modes may be incompatible where interference prevention is concerned.

16. The Commission should consider whether the “operator responsible” premise of Part 97 may need clarification where digital software is concerned. Rules may need clarification and mandate interference prevention by operators in a common mode (like telegraphy) where digital software

does not allow a common method of ascertaining that a frequency is clear prior to use. For example, two users are in a CW conversation where each takes a turn at transmitting. A digital station searching for a frequency has no common mode to ask if the frequency is in use, but must rely on patience and a software display. If one of the CW stations (in the middle of a long transmission) is not readable by the digital station and the digital station has no means by which to simply ask if the frequency is in use, the station may begin transmission on the same frequency unknowingly. When the readable CW station answers the distant CW station it can easily be perceived by the digital station as harmful interference. This example occurs today on Amateur frequencies due to mode incompatibility.

17. The Commission must also address problems with interference from automatic stations that have no real means to detect anything other than another digital station. The ARRL plan calls for allowing these stations to operate anywhere in the bands based on the station's occupied bandwidth. SPAR strongly disagrees and supports the idea that automatic stations should be segregated into specific subbands (as they are today) or totally disallowed until digital software can detect that a frequency is in use with a high degree of reliability is freely available.

18. Where commercial competition is concerned, one of the groups set to benefit the most from the adoption of the ARRL petition are proponents of software known as WinLink. WinLink software allows the sending and delivery of email via Amateur HF frequencies for boaters, users of recreational vehicles, and world wide organizations with the need to communicate. These services are also supplied by commercial competitors including, Iridium, OrbComm, Globe Wireless, PinOak Digital, SeaWave, Kiel Radio, Bern Radio, SailMail, BushMail, CruiseEmail and Monaco Radio just to name a few. In a November 2003 article which appeared in Cruising World Magazine, the following quote appeared:

"Steve Waterman (K4CJX), one of the many folks who operates a station free of charge to the ham community, claims that there's no commercial HF radio email system faster or more reliable than WinLink"

Mr. Waterman is one of the developers of WinLink and the quote clearly shows the intent to bypass commercial interests and offer WinLink to customers otherwise eligible for commercial service as covered in Part 97.113 (a)(5). To the members of SPAR, this spotlights the need for clarification of FCC Rules concerning this practice before ruling on any petition which might encourage more digital use.

19. By addressing these issues, the Commission has the opportunity to set a clear tone for operation of new digital technologies for the future. The Commission should also give a clear signal to Amateur licensees concerning the maximum desired bandwidth on HF frequencies. The message should be clear that the direction we must take is to implement new digital modes that make better use of bandwidth, and eschew the temptation to implement spectrum wasting wideband digital applications that can be done better by commercial providers. It must also be made clear that the number one goal should be harmony in spectrum use, that interfering automatic stations and software in competition with commercial providers has no place in Amateur Radio. The Commission should also take the opportunity to clarify that Amateur Radio is a service by and for its licensees and that we must remain firmly in control of our stations. This control must include preventing use by non-amateurs (even in the guise of email) and ensure the non-commercial future of the service by limiting competing activities as well as the obscenity and pecuniary issues related to direct connection to the Internet. The Commission should also clarify the direction we must take where encryption is concerned and clarify the interpretation of rules where email encryption is concerned.

IV. Addressing Fairness

20. Once the Commission clarifies rules as suggested above, the actual petitions submitted must be examined. The primary goal of any plan must be fairness. Fair allocation of spectrum must be based on use and must respect all modes based on use patterns.

21. Available statistics show Amateur mode use on HF today is estimated at 60% SSB use, 30% CW use, and 10% Digital use. Of the 10% of Digital users, it is estimated that 90% of them use narrow digital modes such as RTTY and PSK31. Estimates of wide band digital users on Amateur Radio today are at less than 1%. (Note: A survey published with RM-11305 confirms that overall digital use may be far less than 10% and more like 6%.)

22. As an example of the lack of fairness, the ARRL Petition (RM-11306) seeks to limit the 200Hz allocation in 40 Meters to 35 kHz (7.00 to 7.035). This would conceivably take nearly 40% of users (30% CW and an additional 9% for Narrow Band Digital users) and herd them into 35kHz of spectrum while allowing the remaining 1% of digital users over 60kHz of spectrum for 500Hz bandwidth applications. This clear lack of fairness in and of itself warrants denial of RM-11306. RM-11306 proponents are quick to point out that by definition, the narrow bandwidth modes (200Hz) would be allowed in the remainder of the band allocation as they meet minimum requirements. The real concern to SPAR is that RM-11306 encourages use by 500Hz modes in

band areas regularly used by telegraphy under current rules. Changes sought in the petition will effectively have a herding effect, pushing CW and narrowband digital users lower in the band.

V. Effects of Mode Mixing

23. RM-11306 proposes to mix digital signals and analog voice signals in the current voice bands. All evidence from other industries (like the Cellular Telephone Industry) points to a need to segregate digital and analog modes. Information gleaned from past use under current rules is as ineffective as were the lab tests by cellular carriers in showing the ability of modes to coexist. In practice (under band loading), the cellular carriers found that for most modes the best solution was segregation. Likewise, higher occupancy rates of digital modes mean greater spacing is needed between transmissions resulting in less 3.5kHz signals on HF frequencies than is experienced today.

24. Due to Amateur Radio spectral path loss and propagation variations, it is well known that several SSB conversations can occupy the same frequency at the same time. How many conversations can be involved in this "propagation stacking" is dependent upon several factors. Regardless, a human can distinguish between several SSB conversations operating at different dynamic levels. Conversely, if two digital signals exist on the same frequency most digital programs will copy the stronger of the two signals or one signal at a time, but not both. In the case of two signals of similar strength, intermixing of the two digital streams is seen by digital software as interference.

25. In the case of different modes, interference between modes (such as SSB and PSK31) will be a determining factor for the spectral efficiency of each type of signal. As an example, it is known that PSK31 cannot exist with a SSB signal in the 350to 800hz (audio) area of the SSB signal because there is too much power in the SSB signal resulting degradation in the PSK31 received data stream while the Amateur using SSB is speaking. Likewise, PSK31 signals pose interference problems to the SSB operator and can impact the intelligibility of the SSB signal in the 1500hz or 2000hz (audio) range because that area of the SSB signal carries a significant part of mode intelligibility.

26. SPAR believes that for these reasons, any request beyond current regulations to allow digital signals to share common spectrum with analog voice modes (or CW) as requested by this (or any) petition that may come before the Commission should be denied.

VI. The Trap of Implementing of Old Digital Technology

27. The ARRL Petition limits of 3.5kHz bandwidth for digital use is actually meeting with disapproval in the “Digital Community”. In an article in the December 2005 edition of CQ Magazine, columnist Don Rotolo (N2IRZ) states:

...a flat bandwidth maximum of 3.5kHz is proposed (with an exception for AM), raising quite a ruckus in the digital community. . . Considering the service that the emergency response community wants and needs, which is a relatively fast data channel than can span one to three hundred miles, such a narrow bandwidth does not meet the need.

Mr. Rotolo also objected to the exemption given to the AM mode in the ARRL petition, the obvious inference being that wider digital bandwidth was more worthy of the consideration. Mr. Rotolo also went on to arrive at a thumbnail estimate of the need for 25kHz spectrum chunks for his applications.

28. A credible “rule of thumb” verified by tests in the Cellular Industry show that users over an RF link can expect an average of 2.0bps of throughput per 1Hz of spectrum. Based on this number, bit rates can be predicted and practical use ascertained:

100Hz = 200bps	Good for Text Typing
500hz = 1.0kbps	Fast Text, Email Transfer, Text Files
2.5kHz = 5.0kbps	Email, slow binary file transfer, Text
25khz = 50.0kbps	Data service that rivals “dial-up” at about 28.8kbps
150kHz = 128kbps	(Icom D-Star/ID-1 Specifications) Rivals Cellular Data, passable Internet Interconnect.
200kHz = 400kbps	Rivals Cellular data rates, Internet Interconnect.

This data clearly shows that estimates of needed bandwidth by the digital community are grossly understated where they desire data rates that rival commercial services.

29. The article in CQ illuminates the tendency for digital advocates to get carried away in their zeal for digital mode use by requesting a disproportionate amount of spectrum. Indeed the entire ARRL petition was conceived by digital enthusiasts with little regard to the petition's effect on users of SSB and CW modes. We ask the Commission to be mindful of the small number of actual wideband digital users when ruling on RM-11306 and the need to protect the majority of Amateurs who do not use digital modes. SPAR believes that without limits on HF digital bandwidth, there are a small groups of digital enthusiasts (less than 1% of Amateur use) who will seek to use bandwidths of at least 25kHz (or more) thereby seriously damaging spectral efficiency.

30. The members of SPAR hope that the Commission will agree that implementation of current "state of the art" data rates will require bandwidths of 200kHz or greater, destroy spectral efficiency where the number of **simultaneous amateurs served** and therefore should be discouraged. We urge the Commission to give clear direction in its comments on RM-11306 that the goal of digital experimentation on Amateur Radio should be development of new more efficient data modes that use less bandwidth as opposed to implementing current wideband digital modes better offered by commercial services.

VII. No Mandate for Bandwidth Bandplanning

31. SPAR believes that there is no demonstrable need for bandplanning by bandwidth. There is no mandate from the Commission, nor is there a mandate in International Rules. In fact, countries who have implemented bandwidth based bandplanning are having second thoughts as the following quotes illustrate:

*General Conference, Davos, 11 to 16 September 2005, IARU Region 1 HF Bandplan Principles from the "Key points and proposal" section: "The HF bandplanning basis, on which the current IARU Region 1 HF bandplan is based, accepts CW QSO's across all bands, except within CW beacon segments. Experience shows that telephony and digital modes cannot share the same segments, and should be assigned separate segments in the HF band plan. **The establishment of all mode segments, mixing analog and digital modes, should be avoided** because of mutual interference. Digitized speech should be considered a digital mode in bandplan matters, because such a mode is transmitting digital signals determined by a digital protocol (recommended by the IARU Region 1 Interim Meeting 2004)."*

From the USKA Society, Switzerland, Paper Number 31:"With a 3-year experience the actual HF bandplan (decided in San Marino 2002) does neither fulfill the needs of the users nor

*is respected by them. The definition of band-width is not well-trying because **mainly on 10, 14, and 21Mhz the recommendations of the IARU Region are often not respected.***

*From the RSGB, Improving Bandplan Compliance, paper number 138: "An increasing proportion of the Amateur Radio community is using non-CW modes and deploying beacons within the CW communication sub-bands. National societies could do more to improve compliance with IARU bandplans. Note: The authors believe that the degree of compliance within the CW sub-bands in particular is indicative of the respect for IARU bandplans in general. The IARU Region 1 HF Bandplan has served the amateur community very well for many years, and has always been made available by the IARU member societies through a range of printed publications and internet resources. However, **in recent years, it has been observed that an increasing number of Amateur Radio operators can be heard operating data and telephony modes as well as beacons that transmit position and propagation data within the CW communication subbands. Non-Morse stations within the CW sub-bands are getting more aggressive and more confident, believing that they are "entitled" to do what they do.***

From the Conclusions section: "That each national society (or, initially, a small 'pilot' group of national societies) work together to develop common and consistent methods for bandplan compliance by logging incidents of non-compliance within their national borders; producing regular reports that summarise the non-compliances."

32. Clearly these quotes show that bandwidth based bandplanning is in its infancy and that the concept may be flawed based on incorrect basic assumptions concerning the ability of world amateurs to follow "gentleman's agreements", the ability of modes to co-exist, and the need for wildly expanded digital use. Indeed beyond space to experiment, how can we predict what the bandwidth requirements and interference potential could be for modes and uses not even conceived. Surely the Commission must agree that if the need for spectral efficiency disallows digital modes with more than 3.5 kHz bandwidth, and digital modes cannot coexist with other modes as suggested in the IARU quotes above, the entire issue bears more study before rules are changed.

VIII. Omissions From the ARRL Plan

33. SPAR believes that automated sub-bands are the only effective way to operate an automated station of any kind in the future if interference free operation is to be assured. For example, the Packet Network has been operating within sub-bands since its establishment many years ago, and this operation is transparent to Amateurs because subband operation eliminates

interference problems either to or from the automated stations.

34. Additionally, the beacon sub-bands are vital to propagation studies and are missing from the League's plan. Beacon Stations are an important educational and operating tool for all Amateurs who share HF spectrum and as such, deserve the protection from interference that only assignment to sub-bands can offer.

35. Generally, these specialized sub-bands serve two important functions. They protect amateurs from interference issues "up front", and they allow a standard location on the bands for certain types of signals (like beacons) which require this interference free locatability to accomplish their mission properly.

36. SPAR believes that the ARRL petition (and all regulation by bandwidth plans) fail to note that some of the newer digital modes, e.g. Olivia (developed by Pawel Jalocho of the Czech Republic), provide for different bandwidths and speeds based on propagation and received signal strength. Based on bandwidth regulation plans like the ARRL petition, this capability is rendered useless unless data operation is initiated and occurs in the wide bandwidth area (to allow full ranging of data speed to meet conditions).

37. Additionally, when this type of software auto ranges (automatic and/or dynamic bit rate adjustment) and selects a bandwidth, the probability exists that another signal will select an adjacent frequency with standard separation. Should the auto ranging process occur again, the potential exists for the software to expand bandwidth and interfere with the neighboring user.

38. We believe that operation by Amateurs using new auto ranging data modes in the wide bandwidth area is not desirable for spectral efficiency and illustrates how digital development may ultimately interfere with analog voice modes unintentionally.

39. Another omission in the ARRL plan involves contesting, a popular part of Amateur Radio. Currently testers are bound by the Authorized Omissions in Part 97 to certain band segments. A bandwidth plan such as the one proposed by the ARRL would remove most of the limits involved allowing 500Hz digital users to occupy greater portion of the spectrum assigned to 3.5kHz applications during contests. Likewise, logic used by digital supporters to defend the 35kHz allocation for 200Hz users on 40 meters is that CW can be used anywhere on the bands. This clearly invites telegraphy users to spread out during contests, and may require they do so under normal circumstances due to the unfair allocation.

IX. Conclusions

40. The members of SPAR believe that bandwidth **based bandplanning is not mandated**, is not working as promised elsewhere, is not fair without fair spectrum allocation, and is prone to allowing more interference. We believe that the ARRL Petition does not fairly allocate spectrum, has no bandplan for members to evaluate, and was conceived in a digital vacuum.

41. We further note that before the Commission considers any bandplan that might encourage digital use, **rules must be clarified** concerning the potential for obscenity, pecuniary interests, and competition with commercial services such use may encourage.

42. **SPAR admonishes the ARRL for the closed process** used in putting their petition together and we urge them to include not only digital mode users, but representatives from all mode use in their future planning.

43. We respectfully ask the Commission to continue to **encourage interference free subband protection** for beacon stations, and that any type of automatic stations authorized in the future be assigned by regulation to specific operating subbands. We feel the League clearly shows an intent not to segregate these types of stations and without Commission encouragement, the problem will not be solved by simple bandplanning.

44. SPAR believes that a bandplanning process must be fair, flexible, inclusive, effective, oriented for the future and realistic. We believe the ARRL did not follow this process and urge the Commission to **deny RM-11306** for this and other reasons stated herein.

45. SPAR believes that experimentation with digital modes can be done under current regulations with minor changes to mode designators. Therefore we urge any and all bandwidth bandplanning petitions be denied and current rules modified to address the specific limited issues.

46. We respectfully ask that until software/hardware can adequately detect a non-digital signal with a high degree of reliability, that the use of automatic stations of any kind outside of automated sub-bands be rescinded in the rules immediately.

47. We further note that any petition that mixes modes into a giant “free-for-all” depending on the good will of participants to survive is a sure formula for failure, both in the United States and in other Countries.

48. We acknowledge that the current bandplan has the weight of history and as such had the best chance of supporting compliance in the future.

Respectfully,

On behalf of the nearly 500 members of SPAR, the

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